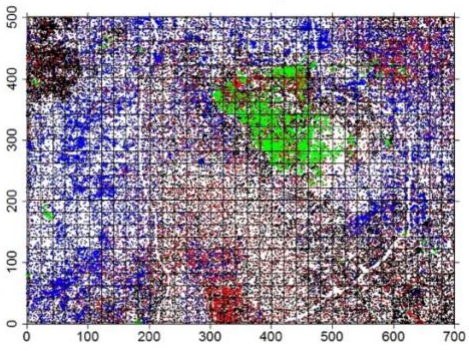
MAPPING CLIMATE IMPACTS

Harvard Forest's Global Earth Observatory

Largest study of its kind in North America; 120,000 trees mapped & measured every 5 years

$50,000 is needed annually to ensure the future of this activity



PHOTOS: Census crew measuring trees; stem map of each tree in the 35-acre forest study area; drone launch for aerial data

THE CHALLENGE

Forests in the Northeast US are part of a global mosaic of intact forest blocks that store vast amounts of carbon, serve as reservoirs of biodiversity, stabilize watersheds, and help support rural livelihoods. Climate change threatens these benefits, reducing forest biodiversity, diminishing rural jobs, and reducing the ability of forests to mitigate climate by removing carbon from the atmosphere. **Forests are rarely studied at a scope that allows for global comparison of their responses to climate change.**

OUR SOLUTION: A VITAL TOOL IN THE GLOBAL ECOLOGY TOOLBOX

A partnership with the Smithsonian Institute's Global Forest Global Earth Observatory established Harvard Forest in 2010 as the largest and longest-running North American site to provide 1) detailed demographic data for plant population modeling, 2) a benchmark site for calibrating satellite-based remote sensing products, 3) long-term monitoring of forest composition, structure, and dynamics, 4) a foundation for studying the spatial ecology of resident plant and animal species, and 5) an incomparable view of Northeast US forests for comparison with temperate and tropical forests around the globe.

Over the past decade, data from this study plot has been featured in 40 national and international publications, including eight in *Science* and *Nature*. NASA recently re-routed the OCO satellite so that it passes over the HF ForestGEO plot, to ground-truth and calibrate remote sensing estimates of forest carbon. HF plot data has also been used in NASA's spaceborne lidar mission (GEDI) to estimate aboveground biomass and to detect forest structure changes associated with insect-induced forest decline. The Harvard Forest Earth Observatory study area encompasses the canopy research tower that provides the longest-running measurements of forest carbon and water exchange in the world. This intersection of research techniques makes the HF ForestGEO plot **the most important site on Earth for understanding temperate forest carbon dynamics**.